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(71) Applicant (for all designated States except US): TELE-COM ITALIA S.P.A. [IT/IT]; Piazza degli Affari, 2, I-20123 Milano (IT).

(72) Inventors; and
(75) Inventors/Applicants (for US only): BELLIFEMINE, Fabio [IT/IT]; Telecom Italia S.p.A., Via G. Reiss Romoli, 274, I-10148 Torino (IT). CHIAROTTO, Alessandro [IT/IT]; Telecom Italia S.p.A., Via G. Reiss Romoli, 274, I-10148 Torino (IT). DIFINO, Angelo [IT/IT]; Telecom Italia S.p.A., Via G. Reiss Romoli, 274, I-10148 Torino (IT). NEGRO, Barbara [IT/IT]; Telecom Italia S.p.A., Via G. Reiss Romoli, 274, I-10148 Torino (IT).

(74) Agents: GIANNESI, Pier, Giovanni et al.; Pirelli & C.S.p.A., Viale Sarca, 222, I-20126 Milano (IT).

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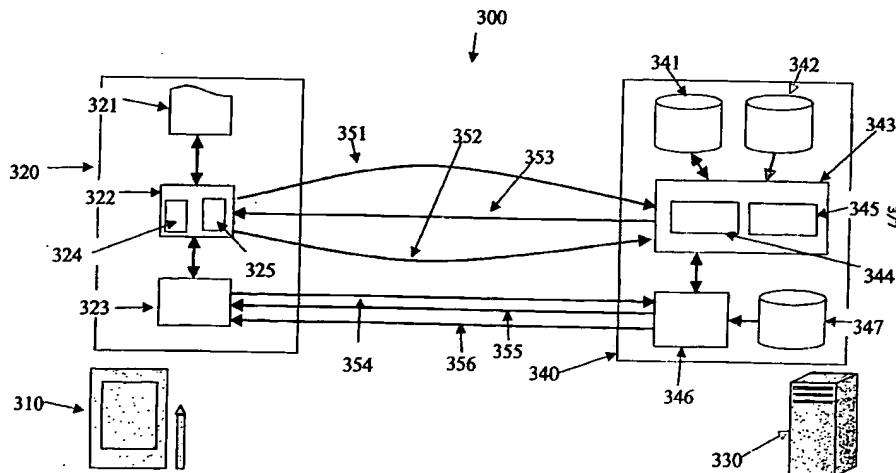
(57) Abstract: Information content is provided from at least one server (330) to at least one user terminal (310), the information content being customized according to a user model (321). To that end at least a portion (352) of the user model (321) provided at the user terminal is sent from the user terminal (310) to the server (330) thus making it available to the server (330). The information is customized on the basis of the user model (321) as made available (352) to the server (330) and sent from the server (330) to the user terminal (310). The portion (352) of the user model possibly stored (341) at the server is eventually deleted from the server (330).

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METHOD AND SYSTEM FOR PROVIDING INFORMATION SERVICES TO A CLIENT USING
A USER PROFILE

                                ✢   ✢   ✢

5   Field of the invention

The present invention relates to systems for
providing information services such as e.g. multimedia
services. The invention was developed by paying
specific attention to the possible use in association

10   with telecommunication systems such as
telecommunication networks, like e.g. the Internet.

In such networks, users are able to access
multimedia contents stored in so-called servers by
resorting to client-server data exchange techniques.

15   Description of the related art

Systems for providing multimedia services allow a
user to receive at a user terminal, such as a personal
computer, a mobile phone or a TV set, selected digital
items such as news and information, mail and

20   entertainment, while also permitting social
interactions by the user.

Use of such systems is becoming more and more
widespread with the introduction of hand held computers
and interactive television, thus leading to such

25   systems being accessed by an increasing number of
untrained users.

Therefore, truly effective systems for providing
multimedia services should not only maintain
information adapted to be accessed by the users, but

30   also provide active "customisation" of the information
contents delivered to different users, while also
facilitating automatic retrieval of information of
special interest for the user.

This kind of tailoring of the information

35   according to the user's needs is often referred to as

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Personalized Information Services (PIS). The technique used for performing such customisation tasks on the Internet or in a similar network is called user modelling, as a person skilled in the art well knows.

5   User modelling, for instance, in regard to the television industry, can be implemented by means of so called Electronic Programming Guides or EPG, which are able to automatically guide a given television user or homogeneous group of users in choosing TV programmes

10   (events) to be viewed.

Such tools differ from each other according to the manner or criterion, inherent to the EPG tools, whereby is generated a table or parameter class able to determine the programming of those events which, within

15   the scope of accessible parameters, correspond with a given user's expectations.

Known EPG tools are constituted by software modules called "Expert modules", able to generate parameter classes called "predictions" to be used to

20   automatically select the events to propose to the user. Such "predictions", in general, are representative of elements which, possibly combined with further elements, representative of personal data of the user, cooperate to the building of the so called "user

25   model".

Therefore the "user model" comprises, in general, a plurality of elements representative of the will of a user or a group of users and can be used as a whole or partially in order to automatically select or customise

30   the information of interest for a user or a group of users.

A user model, in short, is a process that, starting from user data ("user profile") can generate context based predictions on user interests and/or

35   preferences.

As a matter of example, the "predictions" can be generated by at least three Expert modules, respectively the Explicit Preferences Expert, the Dynamic Expert and the Stereo-Typical Preferences
5   Expert modules or combinations thereof.

Tools that use the Explicit Preferences Expert (Explicit Expert) module allow to generate the "predictions" class based on indications explicitly expressed by the user.

10   Tools that use the Dynamic Expert module (Dynamic or Implicit Expert) allow to generate the "predictions" class based on the user's previous choices.

Lastly, Tools that use the Stereo-Typical Preferences Expert module (Stereo-Typical Expert) use
15   stereotypes or categories based, for instance, on the user's age, gender, etc. to identify the "predictions" class to be used in selecting the items to be proposed.

A user model can be advantageously represented by a tree structure. For example, according to the MPEG-21
20   standard, branches can represent preferences or categories, personal data, explicit preferences, browsing preferences.

User modeling can be applied, for instance, in order to generate a multimedia content catalogue,
25   containing a list of digital items available for downloading or streaming at the user terminal. Through user modeling, the list of digital items is, therefore, customized.

Generally, the user modeling task can be performed
30   either on the client side, i.e. the user side, or on the server side, i.e. the side of the service provider.

Figure 1 is a schematic diagram of a system using the client side approach.

In the system shown, designated 100 as a whole,
35   the contents to be transmitted and their descriptions

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are broadcast in an undifferentiated manner towards all
the users in the system. In figure 1 only the client or
user side is shown, where a satellite antenna 140 and a
terrestrial antenna 150 receive TV signals and feed a
5   TV terminal 110. This is typically a set top box or
other similar equipment, connected to a TV set 120. In
the TV terminal 110, a personalization module 111 is
provided that contains a user model. The model stored
in the module 111 permits a subset of items held to be
10 more interesting for the user to be selected among all
the items broadcast.

    Being   located   on   the   client   side,   the
personalization module 111 can obtain user information
easily and timely by analysing the user behaviour and
15 thus "learning" from the previous interactions of the
user with the TV terminal 110, e.g. the selections
performed through a remote control 130. Moreover,
client-side user modeling is safe and makes the user
confident in that he or she has complete control over
20 his or her own user model and any file related thereto.

    In a client-server system (i.e. a data exchange
system where the client requests a service from the
server, and the server fulfils the request), the
client-side user modeling approach shown in figure 1 is
25 not considered appropriate and efficient. This is held
to be particularly true in the case client and server
are interconnected over a network.

    More to the point, this approach will not permit
the user to selectively access services/data for which
30 specific entries are not included in the model
available at the user terminal: a user wishing to
access, e.g. only certain selected sections of a news
service, will thus be forced to download a whole set of
data, including, in addition to the specific
35 information the user wishes to access, additional data

that are of no interest for the user. This is a highly penalizing situation for those users using terminals having reduced processing capabilities such as e.g. mobile phones.

5   Under these circumstances, server-side user modeling is preferably adopted. A schematic diagram of a corresponding client-server system 200 according to the prior art is shown in figure 2.

In the arrangement shown in figure 2, the server
10   250 keeps and manages all the relevant information about the user. Such information is arranged in user modules or files 251 that reside at the server 250. The server 250 also includes a personalization module 252. On the basis of the information contained in the user
15   modules 251, the personalization module 252 indexes and searches a contents database 253, where the contents to be delivered to the clients reside as digital items.

A user terminal such as e.g. a telephone 210, a hand held computer 220 or a personal computer 230,
20   communicates with the server 250 through a network 240, usually the Internet network.

Since the user modules 251 reside at the server, each time the user subscribes a new service a corresponding profile is to be registered. This
25. operation includes sending personal information over the network. This is usually done by filling a form provided by an application running on the server. Thus, in order to establish a user model on the server side, the necessary information must be transmitted from the
30   client to the server over the Internet network 240.

User modeling on the server side is thus exposed to possible concerns in terms of privacy and security. Generally, it requires the user to have a high degree of confidence in the prospected use of his or her own

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personal data by the service provider that maintains the server.

Another drawback is that the user models stored at the server may not be specific for each single user, but rather correspond to aggregate profiles regarding a plurality of users. Oftentimes, for each service there is a fixed, limited set of pre-defined user models among which the user has to choose when registering.

In patent application US2001/0013123 a method for generating user models, in particular for broadcast services, is disclosed wherein the user parameters are gathered via the user terminal and sent to the server to be processed there in order to establish a user model. The user model is then sent back from the server to the user terminal. Such a method inherently suffers from the same drawbacks considered in the foregoing, and also generates an appreciable amount of additional traffic.

Object and summary of the invention

The object of the present invention is thus to overcome the drawbacks of the prior art arrangements considered in the foregoing while providing improved information services.

According to the invention, such an object is achieved by means of a method having the features set forth in the annexed claims, which form an integral part of the description herein.

The invention also relates to a corresponding system, such system being in the form of a network or a part of a network. The invention also covers terminals configured to operate in conformity with the invention and a corresponding computer program product directly loadable in the memory of a digital computer (such wording obviously including a computer network) and comprising software code portions for performing the

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steps of the method of the invention and/or implementing a component of the system of the invention when the product is run on a computer.

Essentially, a preferred embodiment of the
5 invention is a system for providing multimedia services that includes at least one server. The server is connected, through a network, to a user terminal, for sending the information content to the terminal. The server is adapted for customizing the information
10 content according to a user model.
The user terminal is in turn adapted for providing a user model at the user terminal, for selecting at least a portion of the user model on the basis of the service, and for sending the selected portion of the
15 user model from the user terminal to the server.

and sending at least a part of the user model to the server for temporary use and possible storage at the server. Once the transaction is completed, the user model information possibly stored with the server is
20 deleted.

Brief description of the drawings

Further objects, features and advantages of the present invention will become apparent from the following detailed description and annexed drawings,
25 provided by way of non-limiting example only, wherein:
        - figures 1 and 2 have been already described extensively in the foregoing;
        - figure 3 shows a basic diagram of a system according to the invention;
30   - figure 4 and 5 are flow charts of certain steps of a method carried out in the system of figure 3;
        - figure 6 shows a basic diagram of a variant to the system of figure 3; and
35   - figure 7 shows a basic diagram of a further

variant to the system of figure 3.

Figure 3 shows is a basic block diagram of a system for providing multimedia services.

The system, indicated 300 as a whole, generally
5   includes a plurality of user terminals. One such terminal, designated 310, is connected to a respective server 330 over a network such as the Internet, a GPRS or UMTS network, these being of course just non-limiting examples.

10   The user terminal 310 may be in the form of a hand held PC, as is the case of the embodiment shown in figure 3. Alternatively, it may be a personal computer, a mobile phone, a set top box or analogous apparatus. The terminal 310 includes a client module 320.

15   The server 330 hosts a server module 340 of a service provider. Several servers 330 can be connected to the network, supplying at least partly different services.

In figure 3, items indicated with reference numbers
20   from 351 to 355 represent elements of transactions effected over the network using e.g. the Internet Protocol (IP).

The client module 320 comprises a client application 322 for dealing with the client/server
25   transactions, including a user modeling engine 324 and a user model manager module (flying profile manager module) 325. The user modeling engine 324 calculates and manages the complete user model 321 with different known techniques. The flying profile manager module 325
30   is the module responsible for the selection of the portion of the user model to be sent to the server and for the negotiation process of sensible data between client and server as deeply explained in the following sections.

35   For example, in the first step the flying profile

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manager module 325 can select a portion of the user
model to be sent to the server, i.e. one or more
branches of the user model representative of the
category of the service required by the user.

5   Preferably, the branch (or branches) including personal
(and sensitive) data is not sent to the server in the
first step, and is only made available through a
specific negotiation.

The module 320 also includes a client media facility
10 323, i.e. apparatus such as a media player for the
reproduction of multimedia contents.

A user model 321 resides in the client module 320
at the user terminal 310. The model 321 is stored and
managed by the user modeling engine 324.

15   The server 330 includes three different databases:

- a user database 341, adapted for storing – in the
form of temporary files, as better explained in the
following – the user models 321 or parts thereof;

- a content database 347, where the multimedia
20 information content is stored;

- a content description database 342 that contains
brief   descriptions   of   the   available   multimedia
information stored in the content database 347.

The server 330 also comprises a server application
25 343,   for   generating   personalized   and   customized
catalogues for the content description database 342,
and a media server 346, that is a module adapted for
handling the client/server transactions on the server
side   and   thus   able   to   transmit   descriptions   or
30 multimedia information contents to the user terminal
310.

The   server   application   343   comprises   a
personalization module 344 and a customiser module 345.
On the basis of the portion of user model 321 (partial
35 or complete), the personalization module 344 filters

the available descriptions or multimedia information
content items in order to identify a subset thereof
held to be of interest for the user. Of course, such
activity being performed "on the basis" of the user
5   model includes arrangements where personalization is
obtained by the interaction of that model and other
tools already available at the server.
An example of such tools is "collaborative filtering",
wherein the server can generate predictions by
10 comparing choices made by different users in a similar
context.

The customiser module 345 adapts the descriptions
or multimedia information content transmitted to the
user terminal 310 according to user preferences,
15 terminal capabilities, network status and other
parameters that can influence the format of
information.

Those of skill in the art will promptly appreciate
that the various elements described in the foregoing
20 can be hosted on different servers and machines.
Specifically, the user terminal 310 can host the user
model 321 and contain the client application 322, and
the user modelling engine 324 that manages the
personalization functions – while being in any case
25 arranged on he "client" side – can reside on the
hardware of the telecommunications provider.

This may represent a preferred choice when the user
terminal is a mobile phone. In that case, the user
model is stored in the SIM card and the mobile phone
30 operator manages the user models and interfaces the
user terminal via application services providers.

Operation of the system shown in figure 3 will now
be described.

A user that desires to access a particular service,
35 for example a news service, activates the user terminal

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310 that contains the client application 322, i.e. the application for accessing the news, and the client media facility 323, that will allow reproduction of a multimedia content such as a audio/video message, and

5   an instance of the user model 321. This means that, on the client side, the user modeling engine 324 will have available and manage a complete user model 321, defined e.g. according to the MPEG-21 standard.

In order to obtain an improved, more accurate

10 personalization, the basic information required according e.g. to the MPEG-21 standard can be supplemented with additional useful data. The user modeling engine 324 operates by taking advantage of all the personal data available, such as e.g. age, gender,

15 sex, interests, hobbies, explicit preferences, and also the usage history recorded during the previous sessions.

On the basis of this information, or part thereof, the user modeling engine 324 is in a position to

20 predict (by resorting to well known techniques) e.g. the types of news and usage characteristics that better suit that particular user.

By way of example, if the information stored in the user model 321 portrays the user as a businessman in

25 the age of forty, while the usage history indicates that the user frequently accesses financial and political news, the user model engine 324 will predict that the user will expectedly prefer news with financial and political contents while showing less

30 interest in e.g. gossip.

When contacting the service provider 340 that provides the respective information service, the client application 322 will start the transaction by sending, for example as an HTTP request, a catalogue request

35 351.

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The client application 322, and in particular the flying profile manager module 325, will also send separately a - partial or complete - copy 352 of the user model 321 stored in the user terminal 310. In a simple case, the client module 320 will send to the server 330 only the user preferences about the different categories, i.e. Financial News, Gossip, Music News, etc..., whereas in a more complex case the user model 321 will also specify what items of information are held to be private and what data the user may agree or may not agree to diffuse.

The copy 352 made available to the server being possibly a partial copy means i.e. that the user can positively select portions of the user model that the user may not wish to be communicated in any case to the server. The arrangement disclosed herein is thus adapted to operate in full compliance with existing laws and regulations in the area of protection of privacy.

When the server 330 receives the (partial or complete) copy 352 of the user model, it opens a session, which usually leads to the copy 352 of the user model 321 being cached in the user database 341.

Possible caching is any case intended to be only for use at the session, the copy 352 of the user model 321 being thus a "volatile" copy. In fact, when the user closes the session, the copy 352 will be deleted from the server 330. This may occur either directly as a result of the session being closed or after a predetermined time interval (expiration time) possibly identified by additional information sent from the user terminal to the server together with the user model. Such an expiration time can be, for example, a time interval of 1, 5, 10, 60 minutes until one day or a determines number of sessions spaced by the above time

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intervals.

On the basis of the (volatile) copy 352 of the user
model 321, the server application 343 contained in the
server 330, sorts all the available items in the
5   content description database 342. This occurs in a
manner that is known per se and leads to generating a
personal catalogue 353, listing those news descriptions
that better suit the user model.

Of course, the personal catalogue being generated
10   "on the basis" of the partial or complete copy of the
user model 352 may well include arrangements where the
catalogue in question is generated by the interaction
of that copy and other user modelling tools already
available at the server.

15   The personal catalogue 353 is sent from the server
330 to the client application 322 in the client module
320, where the user can finally browse his or her
personal catalogue 353, with the additional possibility
of selecting the information to be presented to the
20   user on the basis of further criteria. These criteria
are not required to be communicated to the server and
may be directed to e.g. "black list" or other filtering
activities on the basis of the age and the role of the
user.

25   We propose a possible embodiment of the invention
for the compilation of a guide related to the cinema:
the user wants to view, on his terminal, a list of the
more interesting available films.

Whenever a client wants to request such a
30   personalized service to a server the following steps
are processed:

- the flying profile manager module 325 selects,
from the user model 321, e.g. in the MPEG-21 format,
that contains a complete picture of the user, the nodes
35   that represents the user preferences for the categories

movie-horror, movie-thriller, movie-comedy, movie-romance, and so on. For example the selected portion of the user model is the following one:

userName = JohnDoe,

pref(movie-horror)=100,

pref(movie-thriller)=50,

pref(movie-romance)=-100.

. . .

-, the client application, and in particular the flying profile manager module 325, sends this portion of the user model to the server

- the server component 342 uses or saves temporarily this portion of the user model into the user database 341

- the personalisation module 344 on the server uses these pieces of information coming from the client to select, from the content description database 342 and according to well-known techniques of matchmaking, the suitable content. For example the film "Sixth Sense" with categorization movie-thriller will be selected, instead the film "Pretty woman" with categorization movie-romance will be discarded.

- the catalogue of these selected films is returned to the client

From this description it is clear that only the user preferences related to the content categories are sent to the server and no sensible data are passed on to the service provider, guaranteeing the user privacy.

The personal catalogue 353 can also be personalized with different graphic user interfaces (GUIs) and layout according to the selected user.

When the user has browsed through his or her personal catalogue 353 and has read a brief description associated to each item of news, the user can select an item from the list in order to have the corresponding

multimedia content presented. This can be e.g. a short
video prepared by the service provider.

The selection is recorded by the user modeling
engine 324 that, by constantly monitoring the user's
5   interactions with the user terminal 310, updates,
refines and improves the complete user model 321
residing in the client module 320, in order to obtain
better predictions.

The selection is then transmitted from the client
10 media facility 323 in the user terminal 310 to the
media server 346 in the server 330 in the form of a
content request 354. The media server 346 retrieves the
content requested from the content database 347. If
necessary, this may occur in combination with
15 customisation:

      - according to the user's preferences, e.g. the
user prefers to watch a summary of the news,

      - according to the terminal capabilities, e.g.
only a low-level video format an be presented on a
20 handheld PC, and/or

      - according to the network capabilities, e.g.
for taking into account that a GPRS connection is
slower than a TCP/IP connection.

The same personalization module 343 previously
25 employed for generating the personal catalogue 353 is
used for such a customisation to produce customized
multimedia information content 355. This is finally
transmitted to the client module 320, where it can be
viewed on the user terminal 310.

30 If the server 330 needs a specific item of
information concerning the user, the server 330 can
request this from the client module 320.

By way of example, the customiser module 345 that
adapts the content for a given user and terminal, may
35 need "age" information e.g. in order to filter out or

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block inappropriate sequences. For meeting these needs, a special transaction 356 may be provided between the server 330 and the client 320. The server 330 requires the age information from the flying profile manager

5   module 325 and flying profile manager module 325 replies only if the user agrees.

Obviously this may occur either as a result of direct user interaction (i.e. a direct reaction of the user to a request presented on the user terminal) or by

10 means of a suitably programmed user agent such as a software module.

Suppose for example that the server would like to know, in the composition of the catalogue, also the attribute "age" of the user

15   - the server component 344 sends the requests for this additional information to the client application 320, and in particular to the flying profile manager module 325

            - the flying profile manager module 325 could

20   1. consult the indications and instructions that the user has delegated to his personal agent, and therefore reply to the server with a "No, this information is private" or "Ok, the age of my user is 29"

25   2. consult explicitly the user and follow his real-time indications

            - if the server receives the required attribute "age" it will be able to refine in a better way the catalogue (for example discarding movie-horror if

30 age<18)

            - if the server doesn't receive the required attribute, the resulting filtering and compiling of the catalogue could be less close to the real user's desires.

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This means that control over personal data and information is always and fully on the user side and, thanks to this process, the invention allows not only the distribution of a portion of the user model, but
5 also the negotiation of sensible data between the server and the client, depository of the complete user model.

After the personalized and customized information content 355 has been sent to the client module 320, any
10 other subsequent user selection can be used in order to better refine the user model 321 and learn more about the user: for instance the user having skipped some sequences or having viewed repeatedly the same content can be recorded as a part of the usage history.

15 The solution described in the foregoing offers the advantages of client-side user modeling in term of flexibility in updating the user model, while maintaining a high degree of security since the user model is made available with the server only
20 temporarily, e.g. by caching it. If possibly stored at the server (in any form) the user model is subsequently deleted, for instance when the session is closed.

The operating steps carried out by the system 300 for obtaining the personal catalogue 353 are
25 represented in the flow chart of figure 4.

There, reference 401 indicates a step where the user issues the request 351 for a personal catalogue 353.

The block 402 represents a step where the request
30 351 (formulated through the client application 322) reaches the server application 343.

While the step 402 is being performed, in a step 403 the client application 322 also sends to the server application 343 the copy 352 of the user model 321;
35 further in step 404, the server application 343

temporarily saves the copy 352 of the user model 321 in the user database 341.

The system then evolves to a step 405, where the personalization module 344 generates a personal
5   catalogue 353. This occurs on the basis of information contained in the copy 352 of the user model 321 taken from the users database 341 and on the basis of content descriptions from the content description database 342.

In a step 406 the server application 343 sends the
10   personal catalogue 353 to the client application 322.

Figure 5 is a flow chart of the operations carried out when the user selects a specific content.

In a step 411 the user selects, in his or her client application 322, specific information content
15   from the personal catalogue 353.

In a step 412 the user modeling engine 324 uses the selection information in a learning and updating process for the user model 321.

While the step 412 is being performed, in a step
20   413, the content request 354 is forwarded from the client application 322 to the client media facility 323.

Then in a step 414 the client media facility 323 sends the content request 354 to the media server 346.

25   In a step 415 the media server 346 retrieves the content from the content database 347 and, under the control of the server application 343, creates a personalized and customized version 355 of the requested content.

30   In a step 416 the media server 346 sends the customized information content 355 to the client media facility 323 and, therefore, the user.

In a step 417, the process of step 412 is accomplished and any other user's action on the client
35   media facility 323 during the viewing of the multimedia

content can be used in the learning process of the user
modeling engine 324.

When the user closes the application on the user
terminal 310, or does not use it for a specified time
5   interval, the session is considered closed and the copy
of the user model 321 possibly stored in the server 330
is deleted.

In that way the user has a high level of confidence
in the safety of the application, because, in the first
10   place, the user can deny the transmission of any of his
or her personal data to the server, and because, in the
second place, the personal model is made available at
the server only temporarily and, if possibly stored at
the server, is deleted at the end of the transaction.

15   Another   important   feature   of   the   arrangement
described is now illustrated in connection with figure
6.

The system 500 shown in figure 6 provides for the
possibility of storing the user model 321 in removable
20   piece of equipment.

In figure 6 reference 540 indicates a smart card
540 that can be used in association with a mobile phone
510, a personal computer 520 and/or a TV set 530, each
of these including a client application 322 and a
25   client   media   facility   323   as   described   in   the
foregoing.

The user can use the mobile phone 510 when away
from home, or the personal computer 520 when at home,
or the TV set 530 along with a set top box, by simply
30   inserting in the terminal he or she wishes to use the
smart card 540 where the user model is stored. In this
way, all the relevant information about the user
profile and preferences can be stored and used by
different terminals, without the need of repeating for

20

each terminal registration procedures and/or learning
processes.

Figure 7 is a schematic diagram of a further
variant of the arrangement described herein, where a
5   system 600 includes different servers 630, 640, 650
that provide different services.

The arrangement described in the foregoing by
referring to co-operation of a user terminal with one
server may be easily extended to such a scenario
10   including a plurality of servers,

This arrangement provides additional advantages for
the user, such as e.g.:

- the user model may be continuously updated by
making sure that updated information is communicated to
15   all the servers involved at each new session, and

- different portions/versions of the user model can
be provided to different servers.

In the system 600 a user may operate a terminal
user 610 with a smart card 620 containing a user model
20   321 e.g. of the MPEG-21 compliant type. The service on
server 630 and service on server 640 (or on server 650)
being e.g. MPEG-21 compliant, the user model 321
prepared for browsing or surfing on the server 630 can
be used also in connection with the server 640 and also
25   the services provided therein. The user's interactions
and activities with respect to services on either of
servers 630 and 640 may thus be used to complete,
update and improve the user model 321 in the terminal
610.

30   This is advantageous since, for subscribing the
service on the server 640, no need exists for the user
of e.g. registering a new user identifier, filling in a
new form with the personal data etc…. Most
significantly, the user model 310 supplied to the new
35   service server is a fully trained one, that is a user

model already shaped with a history of the user's habits.

Of course, the specific details of implementation of each one of the arrangements previously considered can be applied to the other arrangements disclosed.

The arrangements exemplified herein are adapted for use in client/server data exchange systems that are connected through Internet Protocol networks. However, these arrangements can be applied also to systems associated with different networks.

Encrypted and, in general, encoded transmission can be advantageously adopted in client-to-server and server-to-client considered herein.

The arrangements exemplified are suited for implementation on user terminals and servers that have processing and communication capabilities. They can thus be implemented by programming a user terminal and/or a server by means of a suitable computer program product. Again, suitably programming a general-purpose processor architecture on the basis of the present disclosure falls within the ordinary programming capability of those of skill in the art.

It is thus obvious that many changes of the exemplary embodiments shown herein are evident for the man skilled in the art, without departing from the scope of the invention as defined by the claims that follow.

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CLAIMS

1. A method for providing information content in relation to a service from at least one server (330) to at least one user terminal (310), said information

5 content being customized according to a user model (321), characterized that it comprises the steps of:

- providing said user model (321) at said user terminal (310);

- selecting (325) at least a portion of the user

10 model on the basis of the service;

- sending (403) at least a portion (352) of the user model (321) from said user terminal (310) to said server (330) thus making said at least a portion (352) of the user model (321) available to said server (330);

15 - customizing (405) said information on the basis of said at least a portion (352) of the user model (321) made available to the server (330); and

- sending (406) said customized information from said server (330) to said user terminal (310).

20 2. The method of claim 1, characterized in that it comprises the steps of:

- storing (341) at the server said at least a portion (352) of the user model, and

- subsequently deleting from the server (330) said

25 at least a portion (352) of the user model stored at the server.

3. The method of either of claims 1 or 2, characterized in that it comprises the step of providing a user model engine (324) for establishing

30 said user model (321) at the user terminal (310).

4. The method of any of the previous claims, characterized in that it comprises the steps of carrying out a learning process by recording the user interactions with the user terminal (310) and updating

said user model (321) at the user terminal (310) by means of said learning process.

5. The method of any of the previous claims, characterized in that it comprises the steps of:

5   - sending from the server (330) to the user terminal (310) a request for additional information (356) to supplement said at least a portion (352) of the user model (321) made available to said server (330);

10 - submitting said request to the user or to a user agent for approval, and sending said additional information from the user terminal (310) to the server (330) only if the user or the user agent approves the request.

15 6. The method of any of the previous claims, characterized in that said user model (321) is compliant to the MPEG-21 standard.

7. The method of any of the previous claims characterized in that said at least a portion (352) of
20 said user model (321) is made available to the server as a partial copy (352) of said user model (321) containing only a part of the data contained in said user model (321).

8. The method of any of the previous claims, characterized in that it comprises the steps of:
25
- providing a plurality of servers (630; 640; 650) with respective information contents, and

- accessing said plurality of servers (630; 640; 650) via said at least one user terminal (310), wherein
30 said accessing takes place by using the same user model (321) provided in said at least one user terminal (310) by sending (403) at least a respective portion (352) of said user model (321) from said user terminal (310) to the servers of said plurality of servers (630; 640;
35 650).

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9. A system for providing information content from at least one server (330) to at least one user terminal (310) requesting information content from the server in relation to a service, said information content being

5   customized according to a user model, characterized in that it comprises:

- said at least one user terminal (310) comprising a user model engine (324) for providing said user model (321) at the user terminal, a user model manager module

10   (325) for selecting at least a portion of the user model on the basis of the service, and a transaction engine (322) for sending (403) at least a portion (352) of the user model (321) from said user terminal (310) to said server (330) thus making said at least a

15   portion (352) of the user model (321) available to said server (330);

- said at least one server (230; 330) comprising a server engine (343) for customizing (405) said information on the basis of said at least a portion

20   (352) of the user model (321) made available to the server (330) and sending (406) said customized information from said server (330) to said user terminal (310).

10. The system of claim 9, characterized in that

25   said server engine (343) comprises:

- storing modules for storing (341) at the server said at least a portion (352) of the user model, and

- deleting modules for subsequently deleting from the server (330) said at least a portion (352) of the

30   user model stored at the server (330).

11. The system of any of the previous claims 9 to 10, characterized in that said user model (321) is compliant to the MPEG-21 standard.

12. The system of any of the previous claims 9 to 11, characterized in that said user model manager module (325) of said user terminal (310) is configured for making available to said at least one server a partial copy (352) of said user model (321) containing only a part of the data contained in said user model (321).

13. The system of any of the previous claims 9 to 12, characterized in that it comprises:

- a plurality of servers (630; 640; 650) with respective information contents, and

- said at least one user terminal (310) configured for accessing said plurality of servers (630; 640; 650) by using the same user model (321) provided in said at least one user terminal (310) and by sending (403) at least a respective portion (352) of said user model (321) from said user terminal (310) to the servers of said plurality of servers (630; 640; 650).

14. The system of any of claims 9 to 13, characterized in that it comprises a data carrier (540) for storing said user model, whereby said data carrier (540) is adapted for use with a plurality of user terminals (510,520,530).

15. The system of any of previous claims 9 to 14, characterized in that the network (401) is an Internet network.

16. A user terminal for use in a system for providing information content in relation to a service from at least one server (330) to said user terminal (310), said information content being customized according to a user model (321), characterized in that said user terminal (310) comprises a user model engine (324) for providing said user model (321) at the user terminal, a user model manager module (325) for selecting at least a portion of the user model on the

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basis of the service, and a transaction engine (322)
for sending (403) at least a portion (352) of the user
model (321) from said user terminal (310) to said
server (330) thus making said at least a portion (352)

5   of the user model (321) available to said server (330);
wherein said user terminal is configured for receiving
from said at least one server (230;330) information
customized (405) on the basis of said at least a
portion (352) of the user model (321) made available to

10   the server (330).

       17. The terminal of claim 16, characterized in that
it is configured for sending to said server information
leading to store and subsequently delete at the server
(330) said at least a portion (352) of the user model.

15   18. The terminal of any of claims 16 to 17,
characterized in that said user model (321) is
compliant to the MPEG-21 standard.

       19. The terminal of any of the previous claims 16
to 18, characterized in that said user model manager

20   module (325) is configured for making available to said
at least one server a partial copy (352) of said user
model (321) containing only a part of the data
contained in said user model (321).

       20. The terminal of any of the previous claims 16

25   to 19, for use in a system including a plurality of
servers (630; 640; 650) providing respective
information contents, characterized in that it is
configured for accessing said plurality of servers
(630; 640; 650) by using the same user model (321)

30   provided in said user terminal (310) by sending (403)
at least a respective portion (352) of said user model
(321) from said user terminal (310) to the servers of
said plurality of servers (630; 640; 650).

       21. The terminal of any of claims 16 to 20,

35   characterized in that it comprises a data carrier (540)

for storing said user model, whereby said data carrier (540) is adapted for use with a plurality of user terminals (510,520,530).

22. A server (330) for providing to at least one user terminal (310) information content in relation to a service customized according to a user model, characterized in that said server comprises a server engine (343) for:

   - receiving from said at least one user terminal (310) at least a portion (352) of said user model (321) selected (325) on the basis of the service, whereby said at least a selected portion (352) of the user model (321) is made available to said server (330);

   - customizing (405) said information on the basis of said at least a selected portion (352) of the user model (321) made available to the server (330), and

   - sending (406) said customized information from said server (330) to said user terminal (310).

23. The server of claim 22, characterized in that it comprises:

   - a storing module for storing (341) at the server said at least a portion (352) of the user model; and

   - a deleting module for deleting from the server (330) said at least a portion (352) of the user model.

24. A computer program product directly loadable into the memory of a digital computer and comprising software code portions for performing the steps of the method of any of claims 1 to 8 when said product is run on a computer.

25. A computer program product directly loadable into the memory of a digital computer and comprising software code portions implementing the terminal of any of claims 16 to 21 when said product is run on a computer.

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26. A computer program product directly loadable
into the memory of a digital computer and comprising
software code portions implementing for performing the
server of either of claims 22 or 23 when said product
5   is run on a computer.
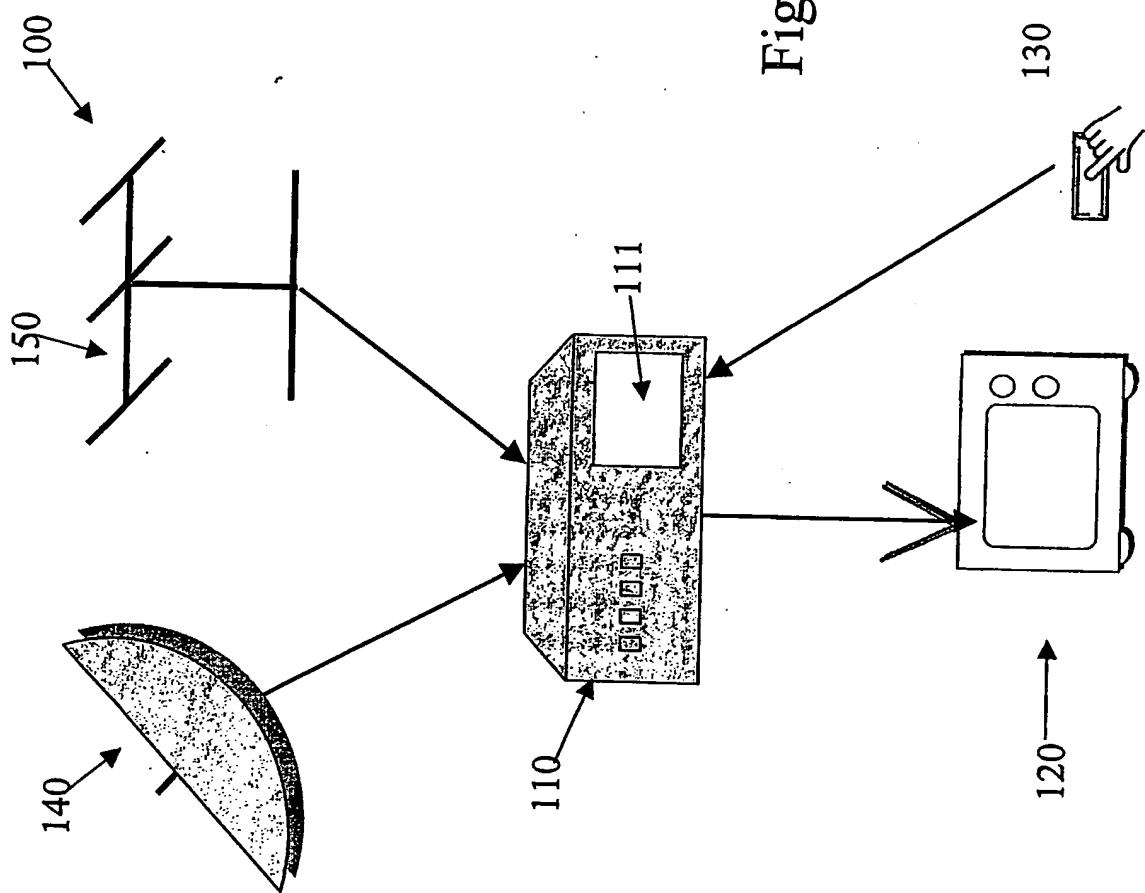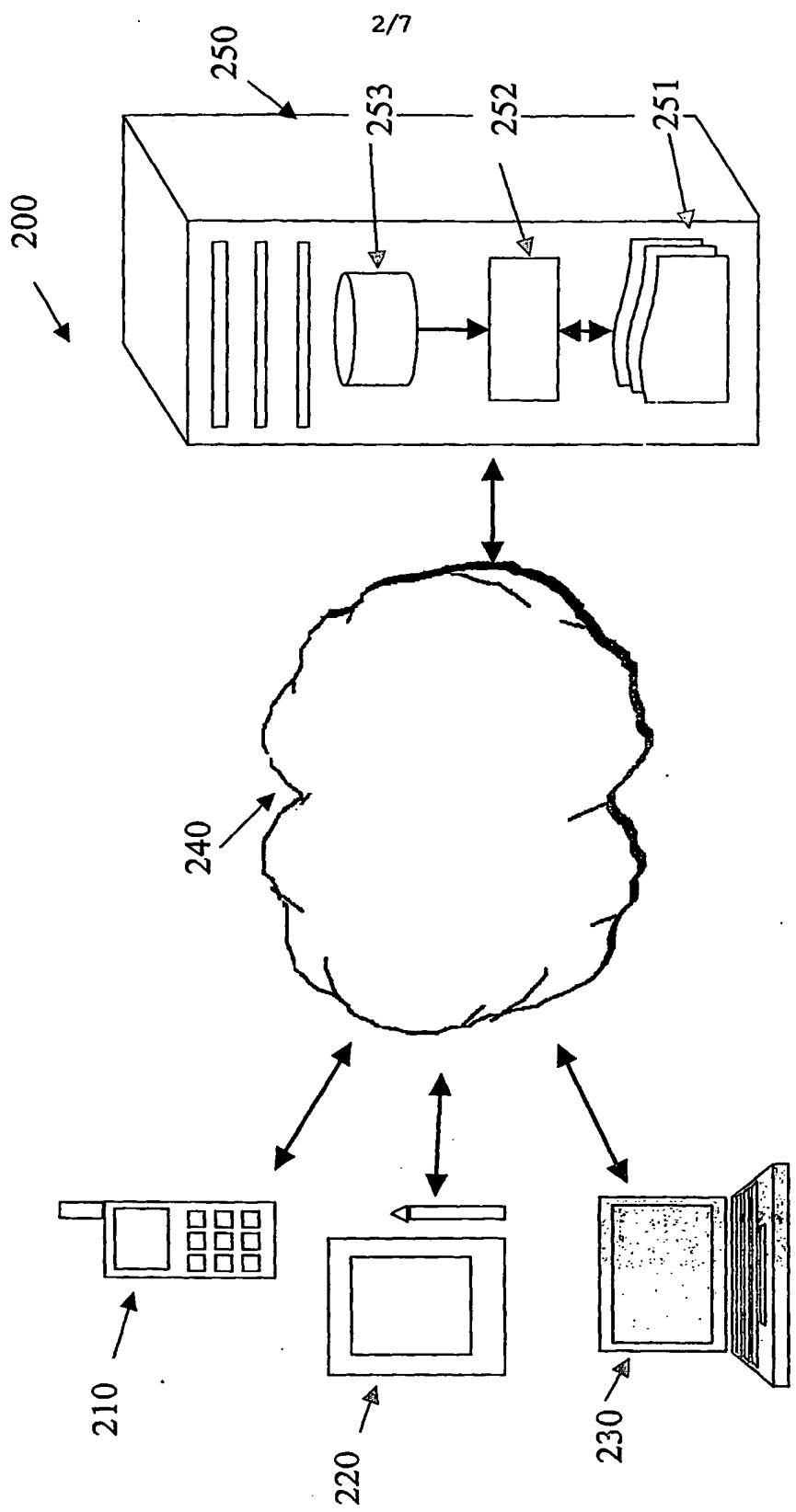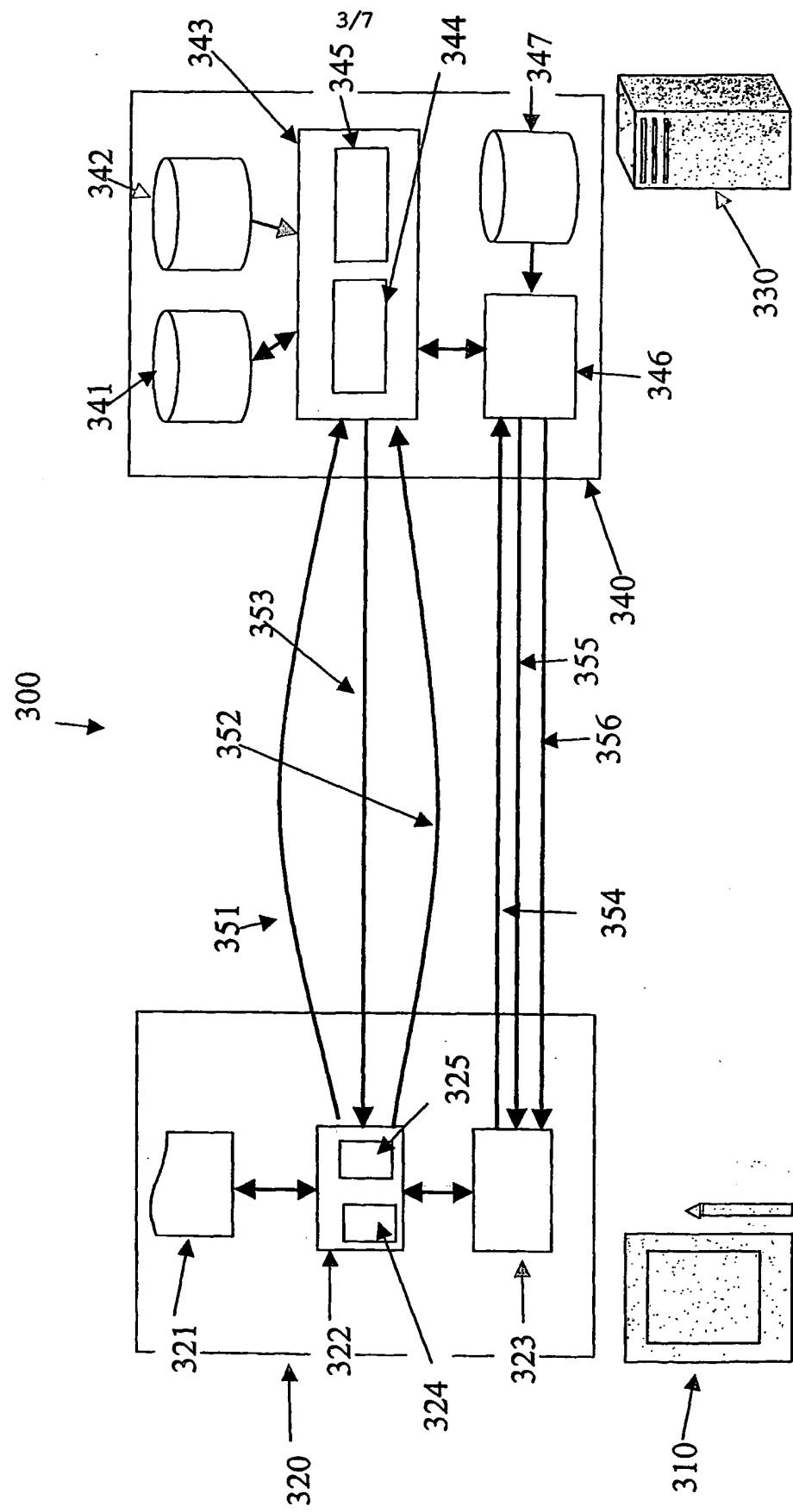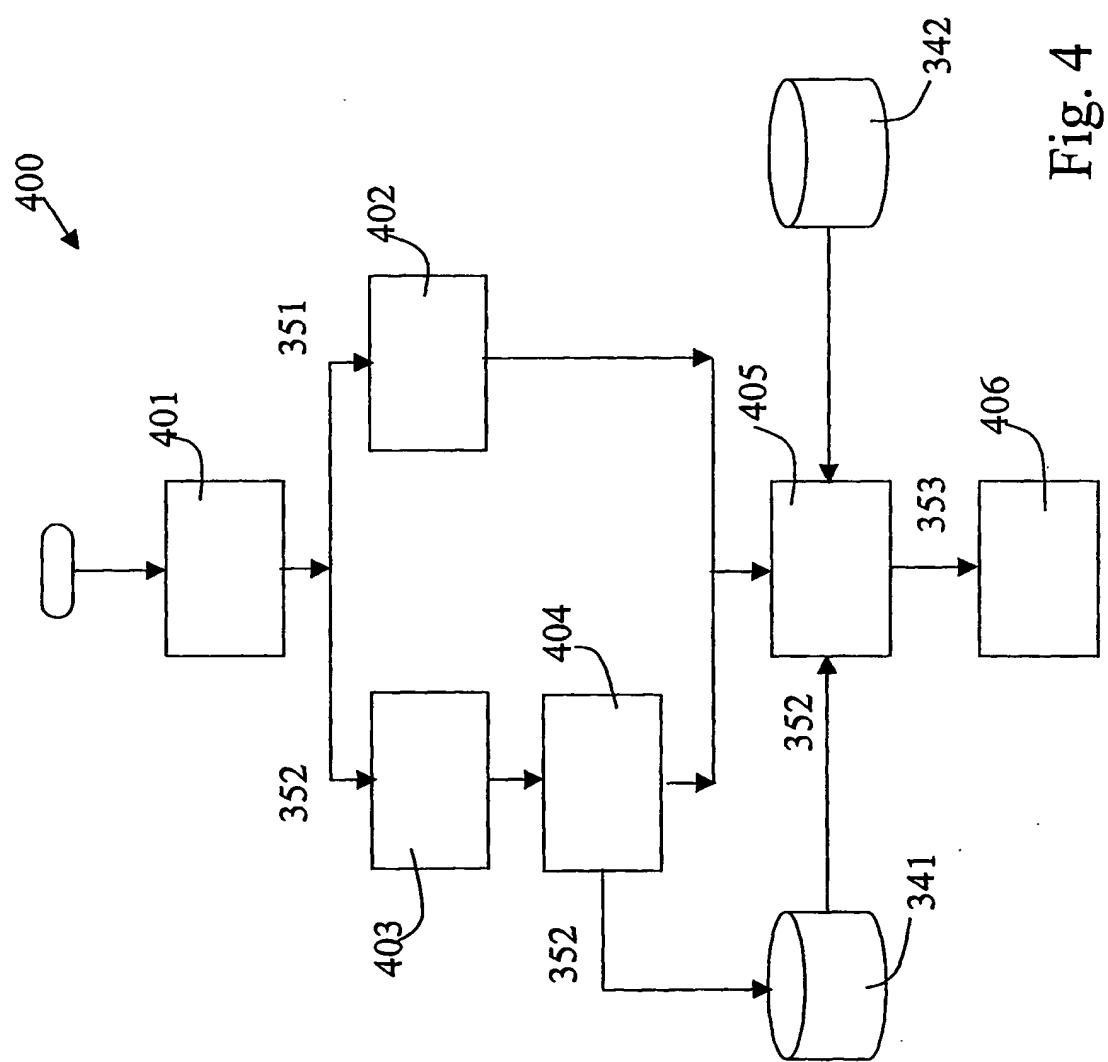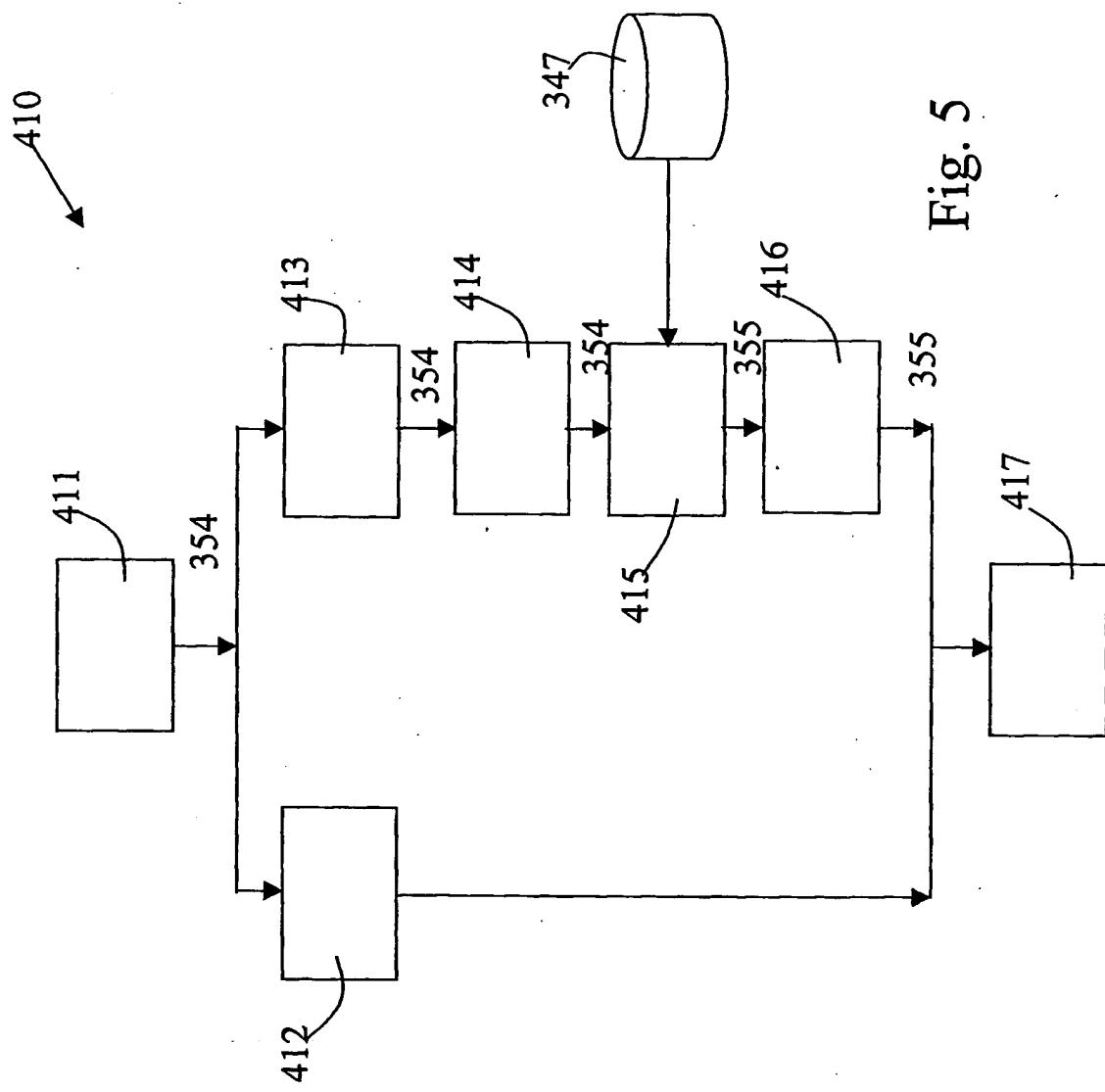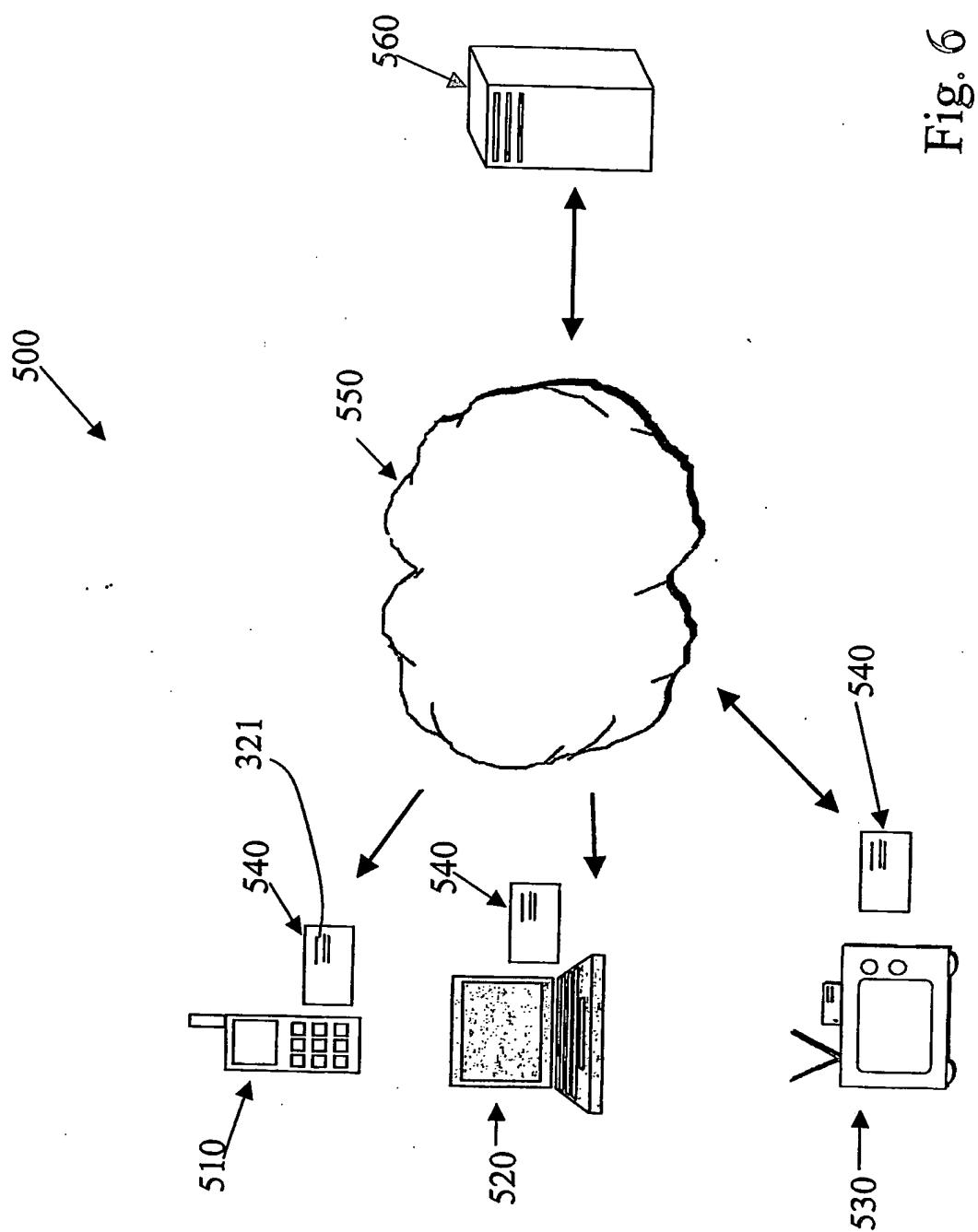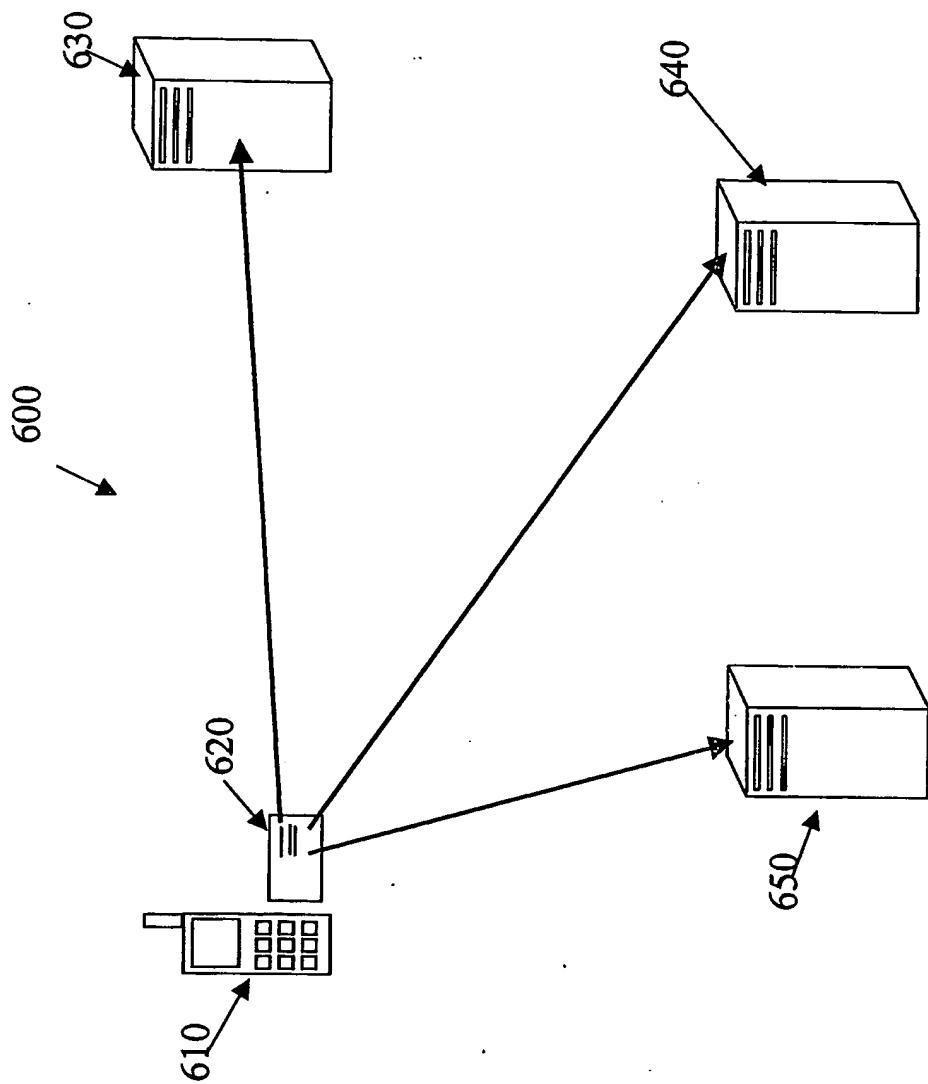
Fig. 1

Fig. 2

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Fig. 3

Fig. 4

Fig. 5

Fig. 6

Fig. 7

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7   H04L29/06   G06F17/30

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7   H04L   G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category°	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 374 237 B1 (REESE KENNETH W) 16 April 2002 (2002-04-16) abstract column 1, line 1 -column 4, line 21 figures 1,2	1-26
A	WO 00 33224 A (INDEX SYSTEMS INC;YUEN HENRY C) 8 June 2000 (2000-06-08) abstract page 3, line 8 -page 4, line 34 figure 1A	1-26
A	US 6 088 722 A (HERZ FREDERICK ET AL) 11 July 2000 (2000-07-11) abstract	1,9,16

-/-

[X] Further documents are listed in the continuation of box C.   [X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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Date of the actual completion of the international search	Date of mailing of the international search report
16 October 2003	29/10/2003

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Nocentini, I

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INTERNATIONAL SEARCH REPORT

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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